

WHAT IS CLAIMED IS:

1. A face image recognition apparatus comprising:
a memory in which a reference feature amount of a
face of a to-be-recognized person is previously
5 registered,

an image input section which inputs a face image
of a person,

a feature amount extracting section which extracts
a feature amount of a face based on the face image
10 input by said image input section,

a recognition section which determines a
recognition rate between the feature amount extracted
by said feature amount extracting section and the
reference feature amount registered in said memory, and

15 a feature amount adding section which additionally
registers the feature amount extracted by said feature
amount extracting section as a new reference feature
amount into said memory when the recognition rate
determined by said recognition section is lower than a
20 preset value.

2. The face image recognition apparatus according
to claim 1, wherein said recognition section calculates
similarity between the feature amount extracted by said
feature amount extracting section and the reference
25 feature amount registered in said memory and recognizes
the face image input by said image input section based
on the calculated similarity, and said feature amount

adding section determines that the recognition rate of
said recognition section is lower than a preset value
when the similarity calculated by said recognition
section is smaller than a preset determining reference
value.

3. The face image recognition apparatus according
to claim 1, which further comprises a camera used to
photograph a face image of a person and an illumination
device used to apply light toward a face of a to-be-
photographed person to be photographed by said camera
and in which said image input section inputs the face
image photographed by said camera.

4. The face image recognition apparatus according
to claim 3, wherein said illumination device includes a
first illuminating section which is disposed in an
upper right position or upper left position of said
camera in an oblique direction as viewed from the to-
be-photographed person to apply light toward the face
of the to-be-photographed person and a second
illuminating section which is disposed below said
camera to apply light toward the face of the to-be-
photographed person.

5. A face image recognition apparatus comprising:
a memory in which a reference feature amount of a
face of a to-be-recognized person is previously
registered and a new reference feature amount can be
additionally registered,

an image input section which inputs a face image
of a person,

a feature amount extracting section which extracts
a feature amount of a face based on the face image
input by said image input section,

a recognition section which performs a first
determining process for determining a recognition rate
between the feature amount extracted by said feature
amount extracting section and the reference feature
amount previously registered in said memory when a new
reference feature amount is not additionally registered
in said memory, performs a second determining process
for determining a recognition rate between the feature
amount extracted by said feature amount extracting
section and a new reference feature amount additionally
registered in said memory when the new reference
feature amount is additionally registered in said
memory, and performs a third determining process for
determining the recognition rate between the feature
amount extracted by said feature amount extracting
section and the reference feature amount previously
registered in said memory when the recognition rate
determined by the second determining process is lower
than a preset value, and

a feature amount adding section which performs a
first additional registration process for additionally
registering the feature amount extracted by said

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feature amount extracting section as a new reference
feature amount into said memory when the recognition
rate determined by the first determining process of
said recognition section is lower than a preset value
5 and performs a second additional registration process
for deleting the new reference feature amount which is
already additionally registered in said memory and
additionally registering the feature amount extracted
by said feature amount extracting section as a new
10 reference feature amount into said memory when the
recognition rate determined by the second determining
process of said recognition section is lower than a
preset value and the recognition rate determined by the
third determining process of said recognition section
15 is lower than a preset value.

6. A passage control apparatus which recognizes a
face image of a passer and controls the passage of the
passer, comprising:

a memory in which a reference feature amount of a
20 face of a person who is permitted to pass through is
previously registered,

an image input section which inputs a face image
of a passer,

a feature amount extracting section which extracts
25 a feature amount of a face based on the face image of
the passer input by said image input section,

a recognition section which determines a

recognition rate between the feature amount extracted by said feature amount extracting section and the reference feature amount registered in said memory,

5 a passage control section which controls the passage of the passer based on the recognition rate determined by said recognition section, and

10 a feature amount adding section which additionally registers the feature amount extracted by said feature amount extracting section as a new reference feature amount into said memory when the recognition rate determined by said recognition section is lower than a preset value.

15 7. The passage control apparatus according to claim 6, wherein said recognition section calculates similarity between the feature amount extracted by said feature amount extracting section and the reference feature amount registered in said memory and recognizes the face image of the passer input by said image input section based on the calculated similarity, and said
20 feature amount adding section determines that the recognition rate of said recognition section is lower than a preset value when the similarity calculated by said recognition section is smaller than a preset addition determining reference value.

25 8. The passage control apparatus according to claim 6, which further comprises a camera used to photograph a face image of a person and an illumination

device used to apply light toward a face of a to-be-
photographed person to be photographed by said camera
and in which said image input section inputs the face
image photographed by said camera.

5 9. The passage control apparatus according to
claim 8, wherein said illumination device includes a
first illuminating section which is disposed in an
upper right position or upper left position of said
camera in an oblique direction as viewed from the to-
10 be-photographed person to apply light toward the face
of the to-be-photographed person and a second
illuminating section which is disposed below said
camera to apply light toward the face of the to-be-
photographed person.

15 10. A passage control apparatus which recognizes a
face image of a passer and controls the passage of the
passer, comprising:

 a memory in which a reference feature amount of a
face of a person who is permitted to pass through is
20 previously registered and a new reference feature
amount of the face of the person who is permitted to
pass through can be additionally registered,

 an image input section which inputs a face image
of a person,

25 a feature amount extracting section which extracts
a feature amount of a face based on the face image of
the passer input by said image input section,

a recognition section which performs a first determining process for determining a recognition rate between the feature amount extracted by said feature amount extracting section and the reference feature amount previously registered in said memory when a new reference feature amount is not additionally registered in said memory, performs a second determining process for determining a recognition rate between the feature amount extracted by said feature amount extracting section and a new reference feature amount additionally registered in said memory when the new reference feature amount is additionally registered in said memory, and performs a third determining process for determining the recognition rate between the feature amount extracted by said feature amount extracting section and the reference feature amount previously registered in said memory when the recognition rate determined by the second determining process is lower than a preset value, and

a feature amount adding section which performs a first additional registration process for additionally registering the feature amount extracted by said feature amount extracting section as a new reference feature amount into said memory when the recognition rate determined by the first determining process of said recognition section is lower than a preset value and performs a second additional registration process

for deleting the new reference feature amount which is
already additionally registered in said memory and
additionally registering the feature amount extracted
by said feature amount extracting section as a new
5 reference feature amount into said memory when the
recognition rate determined by the second determining
process of said recognition section is lower than a
preset value and the recognition rate determined by the
third determining process of said recognition section
10 is lower than a preset value.

11. A face image recognition method used in a face
image recognition apparatus including a memory in which
a reference feature amount of a face of a to-be-
recognized person is previously registered, comprising:

15 inputting a face image of a person,
extracting a feature amount of a face based on the
input face image,

determining a recognition rate between the
extracted feature amount and the reference feature
20 amount registered in the memory, and

additionally registering the feature amount
extracted from the input face image as a new reference
feature amount into the memory when the determined
recognition rate is lower than a preset value).

25 12. The face image recognition method according to
claim 11, wherein said step of determining the
recognition rate is to calculate similarity between the

feature amount extracted from the input face image and the reference feature amount registered in the memory and recognize the input face image based on the calculated similarity, and said step of additionally
5 registering the feature amount into the memory is to determine that the recognition rate is lower than a preset value when the similarity is smaller than a preset addition determining reference value.

13. A face image recognition method used in a face
10 image recognition apparatus including a memory in which a reference feature amount of a face of a to-be-recognized person is previously registered and a new reference feature amount can be additionally registered, comprising:

15 inputting a face image of a person,
extracting a feature amount of a face based on the input face image,

determining a recognition rate between the feature amount extracted by the feature amount
20 extracting section and the reference feature amount previously registered in the memory when a new reference feature amount is not additionally registered in the memory,

25 additionally registering the feature amount extracted from the input face image as a new reference feature amount into the memory when it is determined in said determining step that the recognition rate between

the feature amount extracted from the input face image and the reference feature amount previously registered in the memory is lower than a preset value,

5 determining a recognition rate between the feature amount extracted from the input face image and a new reference feature amount additionally registered in the memory when the new reference feature amount is additionally registered in the memory,

10 determining the recognition rate between the feature amount extracted from the input face image and the reference feature amount previously registered in the memory when it is determined in said determining step that the recognition rate between the feature amount extracted from the input face image and the new
15 reference feature amount additionally registered in the memory is lower than a preset value, and

deleting the new reference feature amount which is already additionally registered in the memory and additionally registering the feature amount extracted
20 from the input face image as a new reference feature amount into the memory when it is determined in said determining step that the recognition rate between the feature amount extracted from the input face image and the new reference feature amount additionally
25 registered in the memory is lower than a preset value and the recognition rate between the feature amount extracted from the input face image and the reference

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